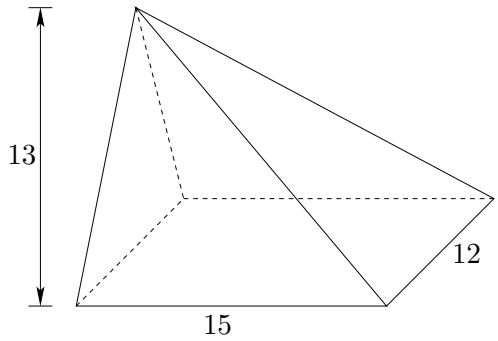
M014 Test 1 **Fall 2006**

Show all work for full credit. Use the back if you would like more space.

1. Evaluate $-\frac{3}{4}-\left(-\frac{1}{5}\right)$. Express your result as a fraction.

$$\begin{aligned}-\frac{3}{4}-\left(-\frac{1}{5}\right) &= -\frac{3}{4}+\frac{1}{5}\\ &= -\frac{3}{4}\left(\frac{5}{5}\right)+\frac{1}{5}\left(\frac{4}{4}\right)\\ &= -\frac{15}{20}+\frac{4}{20}\\ &= \frac{-15}{20}+\frac{4}{20}\\ &= \frac{-15+4}{20}\\ &= \frac{-11}{20}\end{aligned}$$

2. Compute the volume of the following pyramid.



$$V=\frac{1}{3}Bh$$

B is the area of the base. The base here is a rectangle with area $B = 15 \cdot 12 = 180$. Thus, the volume is

$$V=\frac{1}{3}(180)13=\frac{180\cdot 13}{3}=\frac{2340}{3}=780$$

3. List the individual terms in the expression: $3p^2-6(5p^2+p)+p^2$

Term 1: $3p^2$

Term 2: $-6(5p^2+p)$

Term 3: p^2

4. Simplify $8(2c+7)-2(c-3)$

$$\begin{aligned}8(2c+7)-2(c-3) &= 16c+56-2c+6\\ &= 14c+62\end{aligned}$$

5. Solve $\frac{x+2}{5}-4x=\frac{8}{5}-\frac{x+9}{2}$

$$\begin{aligned}\frac{x+2}{5}-4x &= \frac{8}{5}-\frac{x+9}{2}\\ 10\left(\frac{x+2}{5}-4x\right) &= 10\left(\frac{8}{5}-\frac{x+9}{2}\right)\\ 10\left(\frac{x+2}{5}\right)-10\,(4x) &= 10\left(\frac{8}{5}\right)-10\left(\frac{x+9}{2}\right)\\ 2\,(x+2)-10\,(4x) &= 2\,(8)-5\,(x+9)\\ 2x+4-40x &= 16-5x-45\\ 4-38x &= -29-5x\\ 33 &= 33x\\ 1 &= x\end{aligned}$$

6. Solve $s=\frac{1}{2}gt^2+vt$ for g

$$\begin{aligned}s &= \frac{1}{2}gt^2+vt\\ s-vt &= \frac{1}{2}gt^2\\ \frac{s-vt}{\frac{1}{2}t^2} &= \frac{\frac{1}{2}gt^2}{\frac{1}{2}t^2}\\ \frac{s-vt}{\frac{1}{2}t^2} &= g\end{aligned}$$

7. A group of junior high students will be touring Washington, DC. Their chaperones will have the \$1,810 cost of the tour reduced by \$15.50 for each student they personally supervise. How many students will a chaperone have to supervise so that their cost of taking the tour is \$1,500?

$$\begin{aligned}
\$1810 - \$15.50 \cdot (\#\ students) &= \$1500 \\
-\$15.50 \cdot (\#\ students) &= \$1500 - \$1810 \\
-\$15.50 \cdot (\#\ students) &= -\$310 \\
\#\ students &= \frac{-\$310}{-\$15.50} \\
\#\ students &= \frac{\$310}{\$15.50}
\end{aligned}$$

8. "The Fix" coffee shop lists the post-tax (6% Indiana sales tax) price of a cup of coffee to be \$1.50. If the coffee shop applies a 60% price markup, what was the cost of the cup of coffee to the coffee shop?

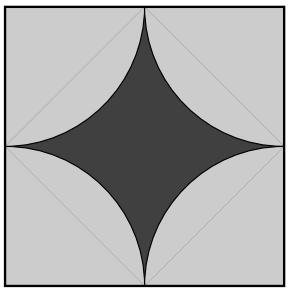
To undo the tax:

$$\begin{aligned}
\$1.50 &= p + .06p \\
\$1.50 &= 1.06p \\
\$1.415 &= p
\end{aligned}$$

Then the markup.

$$\begin{aligned}
\$1.415 &= c + .6c \\
\$1.415 &= 1.6c \\
\$.88 &= c
\end{aligned}$$

Extra Credit:
Find the area of the darkly-shaded region given that the length of each side of the square is 1.5 inches.



The area of the whole square is $1.5^2 = 2.25$. *The area of the lightly-shaded region is the same as the area of a circle of radius* $r = .75$. *Therefore, the lightly-shaded reqion has area* $A = \pi \cdot .75^2 = 1.767$. *Subtracting, we get that the area of the shaded reqion is .482854.*